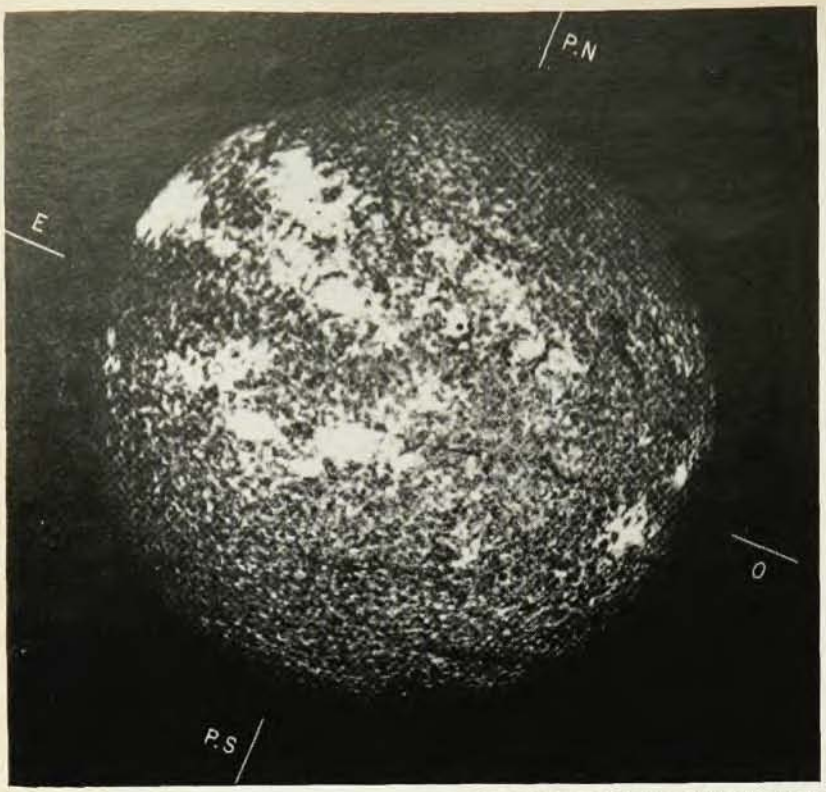


OBSERVATOIRE DE PARIS–MEUDON PHOTO

Ca II SPECTROHELIOGRAM. From SOLAR SYSTEM ASTROPHYSICS

and a few following, critical remarks are meant as character traits; they need not detract from the merits of the book, which doubtlessly will be important in bringing up the coming generation of space scientists.

The origin of the elements and its bearing on the composition of the sun is one-sidedly assumed "according to Hoyle" (pages 27, 28). Radiation pressure in the sun's interior is not even mentioned (page 31); its smallness is not an excuse. Limb darkening in "white" light (page 58) actually refers to integrated radiation. Prandtl's mixing-length theory for convective transport is not the "only available" theory, (page 82) nor is it free from contradictions; a noncontradictory substitute for it has been offered by this reviewer. No figure is given for the general solar magnetic field (page 138). The last two columns in the table on page 326, purporting to represent minimum internal temperatures of the planets and calculated from the perfect-gas law, are meaningless, as well as the pertinent theoretical discussion. The crucial role of the atmospheric infrared window for planetary temperature measurements is not explained (pages 340, 341), and the window is but casually mentioned (page 349). On page 355 the higher daytime temperature of the Martian *maria* is interpreted as indicating "material with a greater temperature inertia", whereas it proves just the opposite.

These are some examples of disagreement. Needless to say, the list of points of agreement would be very much longer. There are many trivial printing errors, such as "Thompson" (page 36) for "Thomson" scattering. Disturbing is the numeration of equations by sections; the page titles do not carry section numbers, and to find an equation mentioned in the text requires quite a search and turning of pages. Maybe this, too, is good for the student?

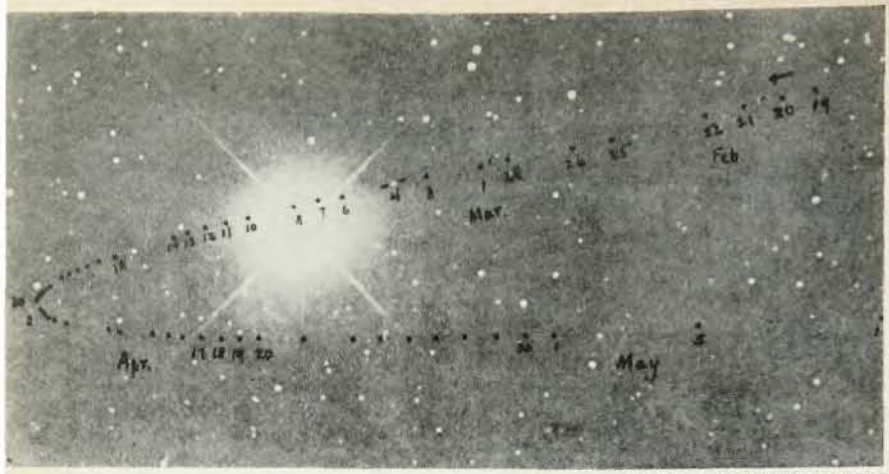
It is a good textbook and is recommended for use at graduate level.

VIVID AND REFRESHING

CONCEPTS IN PHYSICAL SCIENCE. By Sidney Rosen, Robert Siegfried, and John M. Dennison. 577 pp. Harper & Row, New York, 1965. $9.95.

by Jacques E. Romain

A physicist, a historian of science and a geologist have collaborated to write this integrated introduction to the science of the physical world we live in.



LOWELL OBSERVATORY PHOTO

APPARENT PATH OF PLUTO. The planet itself is the white dot above 4 Mar. From: CONCEPTS IN PHYSICAL SCIENCE

The topics covered are taken from physics, chemistry, geology, hydrology and astronomy. The general presentation is elementary but decidedly modern. Moreover, such nonelementary topics as planet reversals, fuel cells and polymers are included. Supplemented as it is by a glossary and a detailed index, the volume is a valuable reading and reference book for young students and for grown-ups.

The authors have a knack for fascinating story telling and for explicit dramatic pictures, of which there are plenty of excellent quality. They put modern knowledge in its historical background, they include anecdotes and they take pains to bring to light the experimental origin of present concepts and their purport in everyday life. He who could read this vivid and refreshing book and remain uninterested would be far more blasé than any young reader may be expected to be. Each chapter is provided with a summary and a list of readings (the latter mostly rather elementary), and the text is interspersed with exercises. A commendable feature is the inclusion of questions, answerable from the text, about some features or consequences of the properties studied (for example, why should a liquid-column thermometer be sealed?). This device should focus the reader's attention on particular points that otherwise might remain inconspicuous in the text. The contributions of the authors are well integrated and cross-referenced. Due stress is laid on key principles, for example the need for operational definitions of physical quantities and the "principle of uniformitarianism" in geology. The mks system of units is adequately used.

If this book is to meet with the success its conception deserves, a few mistakes should be corrected. The author must have been absentminded when he wrote (page 32): "when both planets [earth and Mars] are in line with the sun, Mars appears to stand still," an error that is fortunately contradicted by the accompanying figure 2-12. It is unfortunate that figures 4-4 and 4-5 (page 78) represent two apparently identical spring balances of which the first is marked in kiloponds (a unit not used in the text) and the second in newtons, although this difference is not stated anywhere; this is bound to confuse the lay reader. In figure 6-26, page 152, the minus charges should be plus charges for the direction of the force to be correct. Figure 7-34 (page 184) is a very poor analogy; I wonder how many trained physicists would guess what the author had in mind without referring to the text (I did not). Few specialists will approve of the definition of "work" in the glossary (page 568) as "a force exerted through a distance". Finally, there is a misprint in table 13-3, page 255 (*C1 for Cl*), and the word "gabbro," used several times in the text, is missing in the index and glossary.

* * *

Dr. Romain, who was formerly a teacher at the University of Elisabethville in the Congo, is now an advisor for the Centre de Recherches Routières in Sterrebeek, Belgium.

EMPHASIS ON METHODS

LINEAR SYSTEMS. By Ralph J. Schwarz and Bernard Friedland. 521 pages. McGraw-Hill, New York, 1965. $12.50.

by Bernhard Gross

The theory of linear systems has exercised a strong fascination on scientists and engineers. Many reasons might be given: the practical importance of these systems in modern science and technology; the variety of possible analytical methods in this field, many of which stem from Heaviside's unorthodox but powerful treatment; the possibility of developing a complete self-contained theory for such systems in which only a few areas are still unexplored.

Many books on the subject have appeared in recent years, and any new work must justify itself by some special feature. This volume does so by the choice of topics and their presentation.

Emphasis is on methods rather than system theory. As stated in the preface, the authors aim to provide a unified treatment of the main analytical techniques. In this they have succeeded. Fundamental concepts—linearity, causality, classification of systems—are set out in an introductory chapter. This chapter includes an item on flow diagrams, which are used extensively throughout the work. The authors' exposition of time-domain methods includes a very well presented treatment of the differential-equation method using matrix notations. This treatment, hardly touched on these days by other authors, is important in view of its possible extension to nonlinear systems. Continuous-time and discrete-time systems receive an analogous treatment, and the expressions for the superposition integral and fundamental matrix given for both show the parallelism between these systems.

The next three chapters deal with integral transform methods: Fourier integrals, the Laplace transform and the inverse transform, and the *Z*-transform for discrete-time systems. Although this material is found in many textbooks, its inclusion is, of course, necessary for any unified treatment of the subject.

Random signal problems are treated